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PROVISIONAL PATENT APPLICATION

TITLE:

Information System

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Background of The Invention

1. Field of the Invention

The invention relates to light emitting diode devices. In particular this invention relates to lighting device to provide information. In certain embodiments the lighting device may be incorporated into a computer system, a separate computer peripheral, or a separate device.

2. Description of Related Art

Transmitting and receiving signals virtually instantaneously throughout the world has become a common event. Many devices are available for receiving and possibly re-transmitting signals received from computer networks and other networks. The user interface for reviewing these signals can take many forms including, but not limited to, phones, computers, laptop computers, handheld devices, and stand-alone devices. The development of intelligent light sources, as described in U.S. Patent 6,016,038, has also transformed lighting and lighting control in recent years.

Information abounds through access to the World Wide Web and this information can be received and displayed in many ways on many devices. A computer is one of the

primary portals for receiving, viewing and interacting with much of this information. Hand held devices are also becoming increasingly popular for receiving, viewing and interacting with information. The type of information displayed on these devices is also virtually endless. Information such as, but not limited to, financial, weather, sales data can all be downloaded and displayed. The download devices generally allow the user to interact with the data and perform transactions. Gaming software is also becoming a popular on-line activity where a person can interact with the gaming software from a remote location. Gaming is also very quickly becoming an online experience. Extensions of these games allow two or more users to participate in the same game at the same time even when all of the users are at different locations.

The Massachusetts Institute of Technology has a program in the media arts and sciences named Tangible Media directed by Hiroshi Ishii. The Tangible Media group has the objective to develop human interfaces using physical objects. The physical objects are used to interface with digital media to make the interface easier to use and to create a less complex interface between man and machine. One of the developments from the Tangible Media program is mediaBlocks. MediaBlocks is a tangible interface for physically capturing, transporting, and retrieving online digital media. For example, a mediaBlock may be placed in a slot next to a white board and the information contained on the white board would be digitally transferred to the mediaBlock[1]. The mediaBlock could then be placed in a slot near a printer and the printer would then print the information from the white board. This eliminates the complex computer interfaces that

are used today. This project is dedicated to reduce the complexity of the computer interface that has become commonplace is today's work and play environments.

Another paper written by Hiroshi Ishii, from the Tangible Media Group, discussed the possibilities of ambient controls within an office to increase the awareness of the office worker[2]. In this paper, the authors discuss the sophisticated capabilities of humans ability to process multiple information streams. Humans have an immense capacity for receiving and interpreting information that is occurring in the background of the activities in which we engage. To take advantage of this capacity, the authors created ambient conditions in an office that corresponded to information being received. For example, the office was equipped with a sound system to provide subtle background sounds such as the sound of a tropical forest. The volume and density of the activity in the forest sound stream would correspond to the amount of email or the value of the users stock portfolio. The office was also provided with a lighting pattern on a wall that changed when activity in the next room increased.

It would be useful to provide a peripheral or addition to a standard device to display information in a way in which the user would be alerted to the information without having to interact with the interface. It would also be useful to provide a indicator for displaying information that would be both decorative and informative.

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[1] mediaBlocks: Tangible Interfaces for Online Media, Brygg Ullmer and Hiroshi Ishii, MIT Media Lab, Published I the Conference Abstracts of CHI99, May 15-20, 1999

[2] ambeientROOM: Integrating Ambient Media with Architectural Space, Hiroshi Ishii et. al. , Tangible Media Group, MIT Media Laboratory, Published in the Conference Summary of CHI98, April 18-23, 1998.

Summary of the Invention

Illumination methods and systems are provided herein that overcome many of the drawbacks of conventional systems. In embodiments, methods and systems are provided for multicolored illumination. In an embodiment, the present invention is an apparatus for providing an efficient, computer-controlled, multicolored illumination devices.

In an embodiment of the invention an information system is provided. The information system may include an LED illumination unit for displaying illumination conditions indicative of information. In another embodiment the LED illumination unit is a stand-alone device, networked device, network appliance, network peripheral, LED device, or an LED device with processor. The processor may be a controller, addressable controller, microprocessor, microcontroller, addressable microprocessor, computer, programmable processor, programmable controller, dedicated processor, dedicated controller, computer, laptop computer or other processor.

In an embodiment the illumination device may receive information signals and the information signals may be used to change the hue, saturation or intensity of the illumination device. The information signals could contain information such as financial information, environmental information, computer status information, notification information, email notification information, status information or other information. The information signal may be communicated to the LED illumination device through electromagnetic transmission, radio frequency transmission, infrared transmission,

microwave transmission, acoustic transmission, wire transmission, cable transmission, network transmission or any other communication transmission. In a particular embodiment, the source of the information in the information transmission is from the world wide web (WWW), a database, a network, software, a computer, a computer system or other system. The information may also be obtained through a hyperlink or other information transfer mechanism.

The information signal may be in the form of lighting control signals that are directly readable by an LED illumination device. The information signal may also be in the form other than lighting control signals. In an embodiment, the information signal is in the form of signals other than lighting control signals and a decoder is provided to convert the information signal into a lighting control signal. In an embodiment the decoder may be a processor within the illumination device or it may be a processor separate from the illumination device. The decoder may also be software that is executed by the processor. The information signal may be a digital transmission or it may be an analog transmission. A digital transmission may be readable by the system whereas an analog system may require an analog to digital converter.

The information system may be provided with a user interface. The user interface may be used to select the information to be displayed by the illumination device. In an embodiment the user interface is a computer, personal digital assistant (PDA), computer peripheral, portable interface, stand-alone interface, or any other interface.

One embodiment is a method of providing information where an information signal is received and the information signal is communicated to an LED illumination device. The illumination unit may be associated with an input connection. A processor may be provided to convert the information signal into a lighting control signal. The lighting control signals may be communicated to the illumination control device. The hue, saturation, or intensity (color) may be changed as a result of receiving the information signal. The color may represent the information provided in the information signal. The information in the information signal may be financial information, environmental information, computer status information, notification information, email notification information, status information or any other information.

In an embodiment, a processor may be provided. The processor may be a controller, addressable controller, microprocessor, microcontroller, addressable microprocessor, computer, programmable processor, programmable controller, dedicated processor, dedicated controller, computer, laptop computer or other processor.

In an embodiment, an LED illumination device may be provided. The LED illumination device may comprise at least two LEDs wherein the at least two LEDs produce at least two different spectra; a processor; at least two controllers wherein the controllers independently control power delivered to the at least two LEDs; the at least two controllers further comprising a signal input wherein the signal input is associated with the processor; the at least two controllers are responsive to signals communicated to

the signal input; and a light transmissive material wherein the LEDs are arranged to illuminate the light transmissive material.

The LED illumination device may also be associated with signal input connection. An information signal may be communicated to the signal input connection. The processor may convert the information signal into an illumination control signal; and the illumination device may change color corresponding to the information signal. A second processor may also be provided. The second processor may convert the information signal to lighting control signals. These lighting control signals may be communicated to the LED illumination device or an illumination processor associated with the lighting device.

In an embodiment a user interface is provided. The user interface may be a computer, web browser, PDA, portable device, stand-alone device, web site, touch screen, LCD screen, plasma screen, laptop computer, or any other user interface. The user interface may be used to select information to be communicated to the LED illumination device.

One embodiment is a method of converting an information signal into a lighting control signal. A user interface may be provided wherein a user selects information to be displayed by an LED illumination device. A processor may also be provided for converting the selected information into a lighting control signal and lighting control signal may be communicated to an output port. The information may be selected from a

web site, web page, hyperlink, computer setting, computer system setting, email setting, computer monitor software, monitoring software, computer software or other system.

An embodiment of the invention may take the form of a computer peripheral. Where a computer sends a information signal or a lighting control signal to the peripheral and the peripheral responds by changing to a color that corresponds to the information signal. The peripheral may have a processor wherein the processor may be a controller, addressable controller, microprocessor, microcontroller, addressable microprocessor, computer, programmable processor, programmable controller, dedicated processor, dedicated controller, computer, laptop computer or other processor.

The LED illumination device may have a controller to control the LED output. The controller could be a pulse width modulator, pulse amplitude modulator, pulse displacement modulator, resistor ladder, current source, voltage source, voltage ladder, voltage controller or other power controller.

An embodiment is a method of decoding information capable of being executed by a processor. A user interface may be provided wherein images representing information are displayed. Information may be selected from the user interface. The information may be converted to a lighting control signal and the lighting control signal may be communicated to a communication port. The communication port may be a USB port, serial port, parallel port, firewire port, high-speed communication port, or other communication port.

TO BE BASED ON THE CLAIMS AS FINALIZED.

Brief Description of the Figures

The following figures depict certain illustrative embodiments of the invention in which like reference numerals refer to like elements. These depicted embodiments are to be understood as illustrative of the invention and not as limiting in any way.

Figure 1 illustrates a computer network associated with a lighting device.

Figure 2 depicts a computer with lighting devices.

Figure 3 shows a lighting device.

Figure 4 illustrates a lighting device.

Figure 5 depicts a room with lighting devices.

Figure 6 illustrates a flow diagram.

Figure 7 illustrates a flow diagram.

Figure 8 represents a block diagram.

Detailed Description of the Preferred Embodiment(s)

The description below pertains to several illustrative embodiments of the invention. Although many variations of the invention may be envisioned by one skilled in

the art, such variations and improvements are intended to fall within the compass of this disclosure. Thus, the scope of the invention is not to be limited in any way by the disclosure below.

With so much information available it can be difficult to gather and display the information in a useful manner. Intelligent lighting systems that use LEDs to generate colored light in response to received signals can be used to display and indicate information of all kinds. The lighting systems can be designed to receive signals and convert them to lighting control signals or the signals can be received directly as lighting control signals.

The LED based lighting systems can drive multiple colored LEDs to produce combined colored light. With a lighting system that includes two or more different colored LEDs, combinations of those colors can be generated to the extent the level of intensity or color shifting of the individual LEDs can be controlled. In a preferred embodiment, the LEDs are controlled with a microprocessor to provide pulse width modulation control to three colors of LEDs. The microprocessor is associated with a program input and input signals can be communicated to the program input. When input signals are communicated to the program input the microprocessor can generate LED control signals to produce colored light that is associated with the input.

As used herein, the term "LED" means any system that is capable of receiving an electrical signal and producing a color of light in response to the signal. Thus, the term "LED" should be understood to include light emitting diodes of all types, light emitting

polymers, semiconductor dies that produce light in response to current, organic LEDs, electro-luminescent strips, and other such systems. In an embodiment, an "LED" may refer to a single light emitting diode package having multiple semiconductor dies that are individually controlled. It should also be understood that the term "LED" does not restrict the package type of the LED. The term "LED" includes packaged LEDs, non-packaged LEDs, surface mount LEDs, chip on board LEDs and LEDs of all other configurations.

An LED system is one type of illumination source. As used herein "illumination source" should be understood to include all illumination sources, including LED systems, as well as incandescent sources, including filament lamps, pyro-luminescent sources, such as flames, candle-luminescent sources, such as gas mantles and carbon arc radiation sources, as well as photo-luminescent sources, including gaseous discharges, fluorescent sources, phosphorescence sources, lasers, electro-luminescent sources, such as electro-luminescent lamps, light emitting diodes, and cathode luminescent sources using electronic satiation, as well as miscellaneous luminescent sources including galvano-luminescent sources, crystallo-luminescent sources, kine-luminescent sources, thermo-luminescent sources, triboluminescent sources, sonoluminescent sources, and radioluminescent sources. Illumination sources may also include luminescent polymers capable of producing primary colors.

The term "illuminate" should be understood to refer to the production of a frequency of radiation by an illumination source. The term "color" should be understood

to refer to any frequency of radiation within a spectrum; that is, a "color," as used herein, should be understood to encompass frequencies not only of the visible spectrum, but also frequencies in the infrared and ultraviolet areas of the spectrum, and in other areas of the electromagnetic spectrum.

Figure 1 illustrates a computer network that includes a computer 102, transmitter 112 or 104 for transmitting signals. The transmitter can be any transmitter for communicating signals such as, but not limited to, electromagnetic, IR, RF, microwave, acoustic, wire, cable, or network. The transmitter is for communicating program signals to the lighting device 108. The lighting device could be equipped with a receiver 112 or 110 for receiving the signals. When the lighting device receives the program signals it can generate a particular color or illumination effect. The color or effect may be indicative of the signal received. For example, financial information regarding the stock price of a company. Information regarding the stock price could be communicated to the lighting device and the lighting device could produce light or lighting effects. As a stock price rises, the light could produce green light, when it falls, the light could change to red. The light could indicate the rate of rise or decline by changing saturations of the colors blue and yellow. If the stock price reaches a high enough level, the light could begin to flash on and off green to catch the users eye. A dramatic drop could initiate a flashing red light. The lighting device could produce continually changing colors at the close of the market. Since color is a composite of hue, saturation and brightness these three parameters can reflect multiple pieces of information. For example, a stock value may be

represented by the hue, a market shift may be represented by brightness, and the rainfall outside may be represented by saturation.

A plurality of lighting devices could also be used to generate coordinated effects. The program signals could be directly received from the original source, the computer in this example, or the signals could be retransmitted through another device. One such method of re-transmitting the signals would be to allow the lighting device to complete the communication. The lighting device could be equipped with a separate transmitter or the LEDs used for lighting could be used for the dual purpose of lighting and communicating. There are many other methods of transmitting information such as, but not limited to, electromagnetic transmission, RF, IR, microwave, wire, cable, network, telephone transmission or over the power connections. A plurality of lighting devices could also be used to receive separate channels of information. One lighting device could receive one type of information for display and another device could be used for receiving another signal.

The information to be displayed could also be received from the World Wide Web or through other networks where information is transferred. For example, the computer could receive information from a network and the information could be communicated to the lighting device. The information could also be received from other networks including, but not limited to, satellite networks, communication networks, or telecommunication networks. The lighting device could be equipped with a receiver for

receiving such information and respond by producing colored light when certain signals are received.

Figure 3 illustrates one style LED lighting device. The LEDs 304 and control unit may be attached to a material such as but not limited to, a shade, fabric, diffusing material, semi-translucent material, plastic, plastic dome, sculpted material or any other material. The material may be selected for its absorption or transmission properties to maximize the effect of the colored light. In a preferred embodiment a parchment is formed into a spiral such that the inner and outer sections of the spiral absorb, reflect and transmit the colored light. Figure 3 also illustrates another method of forming a shade. The shade includes several wraps 108 and 302 for distributing the lighting effects. The lighting device may also direct the illumination without the aid of a shade or other material.

The lighting device can take on many forms such as, but not limited to, a table mounted device, a wall mounted device, a ceiling mounted device, or a floor mounted device. Figure 4 illustrates a wall-mounted device that may take on the appearance of being a sconce. Where the LEDs 304 are mounted in a position to shine on the shade 402.

Figure 5 illustrates a room where one or more lighting devices 108 may be located. These lighting devices may produce coordinated lighting effects or each one may produce standalone effects. Coordinated effects can be accomplished in many ways such as, but not limited to, using one lighting device as a master with the others acting as

slaves, sending addressed information to the lighting devices wherein the lighting devices have addressable controllers, or a combination of these methods. In the master-slave set up, one lighting device may receive program signals and then pass on new or the same program signals to the other lighting devices. The lighting device may also pass on part of the information received. The second method could be referred to as a network solution where each of the lighting devices is listening for the signals that pertain to it. Upon receiving the addressed information, the lighting device could initiate the illumination conditions.

Figure 6 depicts a flow diagram to illustrate how the information may be converted into lighting conditions in a preferred embodiment. The value of the information may be received by a system and this information may be converted to a lighting function. The lighting function in turn is then converted into lighting control signals corresponding to a particular hue, saturation and intensity. These control signals are then communicated to the lighting device and the lighting device produces the desired illumination conditions.

The lighting device can also be incorporated into another device. Figure 2 illustrates a laptop computer 202 with two lighting devices 208 and 212, one surrounding the on-off switch for the computer 208 and one independent of other switches. These lighting devices could be used to generate colored light to inform the user of any information including, but not limited to, information received from a network or information regarding the performance of the machine. The button indicator 208 may be

used to alert the user when the laptop is going into a sleep mode before it goes to sleep. This would be useful during presentations to avoid the system from shutting off at a critical point. The other indicator 212 may be used to indicate battery life or other operational conditions such as, but not limited to, processor speed, down load speed, temperature outside as received from an external signal like the world wide web. The indicator can also take on any shape. For example, the edge surrounding the computer screen 204 could be used as an indicator. The edge lighting or any other lighting could be broken up into separate channels for receiving and displaying different information. Individual buttons on the keyboard could also be used as indicators as well as keys.

Another example of where the lighting device can be used to convey information is in a computer, computer room or server room. The server room or server building is a very complicated area that is also the show place of many businesses. Many server and networks are monitored by software dedicated to reviewing the condition of the system. These programs monitor everything from network traffic to individual fan speeds on network devices. The software monitors all aspects of the network or individual device to allow the network manager to optimize the systems performance and prevent breakdowns. It would be useful to provide an intelligent lighting device for monitoring the system and alert the network manager of the system conditions.

A lighting device could be provided to fit into an existing port on a server or system such as, but not limited to, a rack mount enclosure, a 5 ¼" drive slot or a 3 ½" drive slot. The lighting device could also be a separate device. The lighting device can

use also the heat sinking provided by the existing slot on a server or other computer. The lighting system could be associated with the network software and the software could be tailored to provide overall operational characteristics of the system or the network manager may decide to monitor a particular parameter. The system may be indicating overall acceptable performance with a particular parameter declining in performance. This may result in a particular light pattern from the lighting device. The light pattern may be green with an intermittent yellow emitted every five seconds. This would provide information to the manager to check the system even though everything is operating. The lighting device could begin to turn red as the system slows down and it could be programmed to strobe red when the system is in a critical condition.

Another useful example of an information system is where it is used to provide information as to when a task is completed. Computers or other devices may be tied up performing calculations or tasks and the device should not be touched while the system is performing these functions. The device may send lighting signals to the illumination device to alert others not to touch the device. These signals may instruct the illumination device to illuminate red while the device is performing calculations and may begin to change color until arriving at the color green when the calculations are complete.

Many computer rooms have raised floors, false ceilings or walls for passing all of the wires and cables. The tiles in the floor, ceiling and or wall are typically removable to allow access to the wires and cables. One or more of these tiles could also be replaced with a lighting device to provide lighting or information. An embodiment of such tiles

were disclosed in United States Patent Application Ser. No. 09/215,624. A separate panel of lighting devices could also be provided to allow the display of various channels or various levels.

Hard drives in network storage areas are many times made to be accessible to the user. These drives may have LED indicators to indicate activity or power or fault. These indicators are typically single color low output LEDs that flash to make the indication. For example, the indicator for activity may flash every time the drive is accessed. The user looks at the flashing rate of the indicator to get an idea of the usage rate. When you view a large panel of drives you typically see many green indicators flashing and it is very difficult to discern on drive from the next. An embodiment of the invention system could be used in such a drive to provide color or color changing effects as an improved information system. The information lighting system could be in the form of an indicator panel, light, or the entire front plate or enclosure may be used. One embodiment of this is disclosed in United States Provisional Patent Application Ser. No. 60/221,579 "Color Changing Device and Enclosure." These hard drives are sometimes referred to as Hot Swap Hard Drives, Modular Drives, Modular Bays and are sold by Dell, EMC and others. This system could be used in the drive for easy display of information regarding the drive performance, life expectancy, life, temperature, spindle speed or any other information. The drive can also be put into a self-test mode and the lighting device could be used to provide information of the test status or result.

Turning to the flow chart in figure 7, the information system may include an LED illumination unit 108 for displaying illumination conditions indicative of information. The LED illumination 108 unit may be a stand-alone device, networked device, network appliance, network peripheral, LED device, LED device with processor, or other illumination device capable of changing the illumination conditions in response to a signal. A processor may also be provided in or associated with the lighting device and the processor may be a controller, addressable controller, microprocessor, microcontroller, addressable microprocessor, computer, programmable processor, programmable controller, dedicated processor, dedicated controller, computer, laptop computer or other processor.

The illumination device 108 may receive information signals directly and the information signals may be used to change the hue, saturation or intensity of the illumination device. The information signals may contain information such as financial information, environmental information, computer status information, notification information, email notification information, status information or other information. The information signal may be communicated to the LED illumination device through electromagnetic transmission, radio frequency transmission, infrared transmission, microwave transmission, acoustic transmission, wire transmission, cable transmission, network transmission or any other communication transmission.

The source of the information 702 may be from the world wide web (WWW), a database, a network, software, program, computer, or other system. The information may

also be obtained through a hyperlink or other information transfer mechanism. The information may be in the form of a digital signal or an analog signal where the analog signal is converted to a digital signal for processing. Once the information is obtained, it may not need to be decoded 704. The decoding process may involve deciphering the pertinent information form the remaining information in the signal. For example, an entire web page may be down loaded from the World Wide Web and the only information the user wants to send to the lighting device pertains to the snowfall accumulation in Grand Rapids, Michigan. The snowfall information would then be decoded or retrieved from the other information to be further processed.

Following the decoding process 704, the information may need to be transformed into lighting control signals 708. This may be a process executed on a processor to convert the format of the information into lighting control signals that can be executed by the lighting device. For example, the information retrieved from the World Wide Web concerning the snowfall accumulation may be in the format of inches per hour. This value may need to be converted into lighting control signals to produce a particular hue, saturation or intensity of the illumination device.

The elements described in figure 7 may all be incorporated into the illumination device or they may reside in different devices. Where communications between the elements is required, the communication can be accomplished through radio frequency, infrared, microwave, acoustic, wire, cable, network, electromagnetic or other communications method.

The information system may also be provided with a user interface 102. The user interface may be used to select the information to be displayed by the illumination device. In an embodiment the user interface may be a computer, personal digital assistant (PDA), computer peripheral, portable interface, stand-alone interface, web browser, PDA, portable device, stand-alone device, web site, touch screen, LCD screen, plasma screen, laptop computer, or any other user interface. The user interface may be used to select information to be communicated to the LED illumination device. For example, the interface may select the information from a web page to be displayed. The user interface may allow the user to select various information and the information may then be converted to lighting control signals.

Figure 8 illustrates a block diagram of a system according to the principles of the invention. A processor 2 is associated with several controllers 3. The controllers 3 control the power to the LEDs 4. The processor 2 may be any processor or circuit to provide the control signals to the controllers 3 such as, but not limited to, a controller, addressable controller, microprocessor, microcontroller, addressable microprocessor, computer, programmable processor, programmable controller, dedicated processor, dedicated controller, integrated circuit, control circuit or other processor. In an embodiment, the processor 2 is Microchip PIC processor and the LEDs 4 may be red, green and blue. The controller 3 may be a pulse width modulator, pulse amplitude modulator, pulse displacement modulator, resistor ladder, current source, voltage source, voltage ladder, switch, transistor, voltage controller, or other controller. The controller controls the current, voltage or power through the LED 4. The controller also has a signal

input wherein the controller is responsive to a signal received by the signal input. The signal input is associated with the processor such that the processor communicates signals to the signal input and the controller regulates the current, voltage and or power through the LED. In an embodiment, several LEDs with different spectral output may be used. Each of these colors may be driven through separate controllers. The processor and controller may be incorporated into one device. This device may power capabilities to drive several LEDs in a string or it may only be able to support one or a few LEDs directly. The processor and controller may also be separate devices. By controlling the LEDs independently, color mixing can be achieved for the creation of lighting effects. Electronic memory 6 may also be provided. The memory 6 is capable of storing algorithms, tables, or values associated with the control signals. The memory 6 may store programs for controlling the LEDs 4. A program, for example, may store control signals to operate several different colored LEDs 4. A user interface 1 may also be associated with the processor 2. The user interface may be used to select a program from memory, modify a program from memory, modify a program parameter from memory, select an external signal or provide other user interface solutions. Several methods of color mixing and pulse width modulation control are disclosed in U.S. Patent 6,016,038 "Multicolored LED Lighting Method and Apparatus" and is incorporated by reference herein. The processor 2 can also be addressable to receive programming signals addressed to it.

The LED illumination device may also be associated with signal input connection. An information signal may be communicated to the signal input connection 112 or 110. The processor may convert the information signal into an illumination control signal; and

the illumination device may change color corresponding to the information signal. A second processor may also be provided. The second processor may convert the information signal to lighting control signals. These lighting control signals may be communicated to the LED illumination device.

An embodiment of the invention is a method of decoding information capable of being executed by a processor. A user interface may be provided wherein images representing information are displayed. Information may be selected from the user interface. The information may be converted to a lighting control signal and the lighting control signal may be communicated to a communication port. The communication port may be a USB port, serial port, parallel port, firewire port, high-speed communication port, optical port or other communication port.

An example of a software program designed to collect information and convert the information to lighting control signals is in DMXPlayerFrame.java written by Brian Chemel. The code of the program is attached in appendix A and is herby incorporated by reference.

A lighting device could also be incorporated into an appliance to indicate the appliance activity. An example of this would be where a lighting device is incorporated into an iron. The lighting device could indicate the temperature of the hot plate. The indicator could be associated with a temperature sensor, timer or other device for indicating the condition of the iron. As the iron warms up, the lighting device could slowly change from blue, to green, yellow and finally red when the desired temperature is

achieved or when the device is above a predetermined temperature. The entire enclosure could be lit or a portion of the enclosure could be lit. The lighting device could also indicate any other parameters of the appliance. The water level in the appliance may be monitored and the information may be converted to light control signals to generate a particular illumination effect.

The lighting device can produce a wide range of hue, saturation and intensity and each of these parameters can be independently changed. Each of the parameters may be used to indicate different information. For example, if the system is monitoring stock price, the hue could change as a result of the stock price exceeding a predetermined value and the saturation could change as a result of how far in excess the stock value has reached compared to the predetermined value. Another example would be where the hue is indicative of a parameter and intensity and saturation are indicative of a level of the parameter. The lighting device may be monitoring a stock portfolio and the temperature in the Cayman Islands. The hue of red may indicate the lighting device is monitoring the stock portfolio and the hue of green may indicate the temperature. The intensity or saturation of the particular hue may increase as the portfolio or temperature increase.

These devices can also be designed to respond or send information to another device. The device could be associated with sensors, transducers, or other devices for monitoring the activity around or of the device. For example, the device could be associated with a sensor such that when the device is picked up it sends a signal to

another device such as, but not limited to, a network. This signal could then be interpreted by another device for further action.

A lighted keyboard could also be used to teach typing or indicate other information. In teaching, the indicators located under each key could be single LEDs to produce only one color or they could contain multiple colored LEDs. The keys could light when the student is suppose to touch certain keys and the keys could change colors if the instructions were not followed. Games could also be created using the colored or lit keys.

All articles, patents, and other references set forth above are hereby incorporated by reference. While the invention has been disclosed in connection with the embodiments shown and described in detail, various equivalents, modifications, and improvements will be apparent to one of ordinary skill in the art from the above description. Such equivalents, modifications, and improvements are intended to be encompassed by the following claims.

Claim(s)

We Claim:

1. A method of providing information comprising:
receiving an information signal;
providing an LED illumination device wherein the illumination device further comprises an input connection;
providing a processor for converting the information signal into an illumination control signal; and

communicating the illumination control signal to the input connection wherein the illumination device changes color corresponding to the information signal.

2. A method of claim 1 wherein the information signal is generated from at least one of a data base, world wide web, network information, software program, and an information transmission.

3. A method of claim 2 wherein the information signal comprises of at least one of financial information, environmental information, computer status information, notification information, email notification information, and status information

4. A method of claim 1 wherein the processor is at least one of a controller, addressable controller, microprocessor, microcontroller, addressable microprocessor, computer, programmable processor, programmable controller, dedicated processor, dedicated controller, computer, and laptop computer.

5. A method of claim 1 wherein the LED illumination device comprises:

at least two LEDs wherein the at least two LEDs produce at least two different spectra;

a second processor;

at least two controllers wherein the controllers independently control power delivered to the at least two LEDs;

the at least two controllers further comprising a signal input wherein the signal input is associated with the illumination processor;

the at least two controllers are responsive to signals communicated to the signal input; and

a light transmissive material wherein the LEDs are arranged to illuminate the light transmissive.

6. A method of providing information comprising:

providing an LED illumination device wherein the illumination device comprises at least two LEDs wherein the at least two LEDs produce at least two different spectra; a processor; at least two controllers wherein the controllers independently control power delivered to the at least two LEDs; the at least two controllers further comprising a signal input wherein the signal input is associated with the processor; the at least two controllers are responsive to signals communicated to the signal input; and a light transmissive material wherein the LEDs are arranged to illuminate the light transmissive material; a signal input connection wherein the signal input connection is associated with the processor,

providing an information signal to the signal input connection;

wherein the processor converts the information signal into an illumination control signal; and the illumination device changes color corresponding to the information signal.

7. A method of claim 6 wherein the processor is at least one of a controller, addressable controller, microprocessor, microcontroller, addressable microprocessor, computer, programmable processor, programmable controller, dedicated processor, dedicated controller, computer, and laptop computer.

8. An information system comprising:

at least two LEDs wherein the at least two LEDs produce at least two different spectra;

a processor;

at least two power wherein the power independently control power delivered to the at least two LEDs;

the at least two power further comprising a signal input wherein the signal input is associated with the processor;

the at least two controllers are responsive to signals communicated to the signal input; and

a light transmissive material wherein the LEDs are arranged to illuminate the light transmissive;

an information signal input wherein the information signal input is associated with the processor.

9. An information system of claim 8 further comprising a second processor wherein the second processor is associated with the processor; wherein the second processor converts an information signal to lighting control signals and communicates the lighting control signals to the processor.

10. An information system of claim 9 further comprising a user interface wherein the user interface is associated with the second processor.

11. An information system of claim 10 wherein the user interface is at least one of a computer, web browser, web site, touch screen, LCD screen, plasma screen, and laptop computer.

12. An information system of claim 9 wherein the second processor is at least one of a computer, micocomputer, microprocessor, and laptop computer.

13. A method of providing information comprising:

receiving an information signal wherein the information signal is formatted as a lighting control signal;

providing an LED illumination device wherein the illumination device further comprises an input connection; and

communicating the information signal to the input connection wherein the illumination device changes color corresponding to the information signal and the hue, saturation and intensity of the color represent the received information.

14. A method of claim 13 wherein the LED illumination device comprises:

at least two LEDs wherein the at least two LEDs produce at least two different spectra;

a processor;

at least two controllers wherein the controllers independently control power delivered to the at least two LEDs;

the at least two controllers further comprising a signal input wherein the signal input is associated with the processor;

the at least two controllers are responsive to signals communicated to the signal input; and

a light transmissive material wherein the LEDs are arranged to illuminate the light transmissive.

15. A method of converting an information signal into a lighting control signal comprising:

providing a user interface wherein a user selects information to be displayed by an LED illumination device;

providing a processor for converting the selected information into a lighting control signal; and communicating the lighting control signal to an output port.

16. A method of claim 15 wherein the information is selected from at least one of a web site, web page, hyperlink, computer setting, computer system setting, email setting, computer monitor software, monitoring software, and computer software.

17. A method of claim 15 wherein the processor is at least one of a computer, micocomputer, microprocessor, and laptop computer.

18. A computer peripheral comprising:

at least two LEDs wherein the at least two LEDs produce at least two different spectra;

a processor;

at least two controllers wherein the controllers independently control power delivered to the at least two LEDs;

the at least two controllers further comprising a signal input wherein the signal input is associated with the processor;

the at least two controllers are responsive to signals communicated to the signal input; and

a light transmissive material wherein the LEDs are arranged to illuminate the light transmissive;

an information signal input wherein the information signal input is associated with the processor.

19. A computer peripheral of claim 18 wherein the processor is at least one of a controller, addressable controller, microprocessor, microcontroller, addressable microprocessor, computer, programmable processor, programmable controller, dedicated processor, dedicated controller, computer, and laptop computer.

20. A computer peripheral of claim 18 wherein the at least two controllers are at least one of a pulse width modulator, pulse amplitude modulator, pulse displacement modulator, resistor ladder, current source, voltage source, voltage ladder, and voltage controller.

21. A method of decoding information capable of being executed by a processor comprising:

providing a user interface wherein images representing information are displayed;

selecting information from the user interface;

converting the information to a lighting control signal; and communicating the lighting control signal to a communication port.

22. A method of claim 21 wherein the user interface comprises a computer.

23. A method of claim 21 wherein the communication port comprises an USB port, serial port, parallel port, firewire port, optical port and high speed communication port.

24. A computer keyboard comprising:

at least one LED;

a computer keyboard wherein a plurality of keys are associated with the at least one LED to provide the ability to light the associated keys;

a controller wherein the controller includes a program input and communicates control signals to the at least one LED.

25 A computer keyboard of claim 24 further comprising:

software to generate program signals wherein the program signals are communicated to the program input.

Abstract of the Disclosure

An embodiment of this invention relates to an intelligent lighting device that can receive signals and change the illumination conditions as a result of the received signals. The lighting device can change hue, saturation, and brightness as a response to received signals. One example of using such a lighting device is to display particular colors as a response to certain events such as, but not limited to, a corporations stock price, current weather conditions, exchange rate, and traffic information. The lighting device may emit the color red when a stock price has dropped and green when the stock price increases.

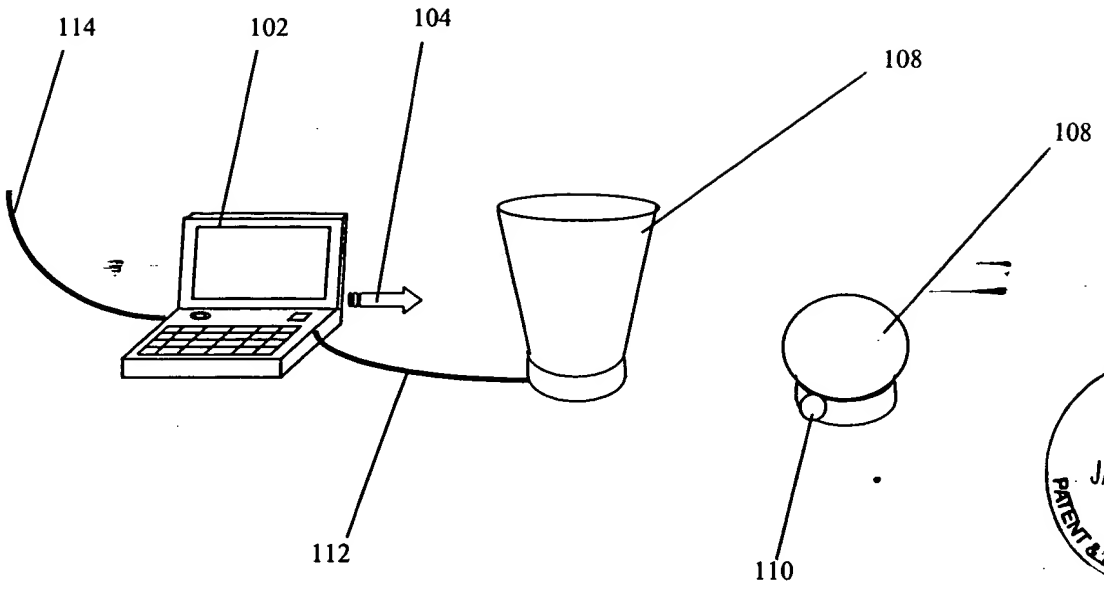

Figure 1

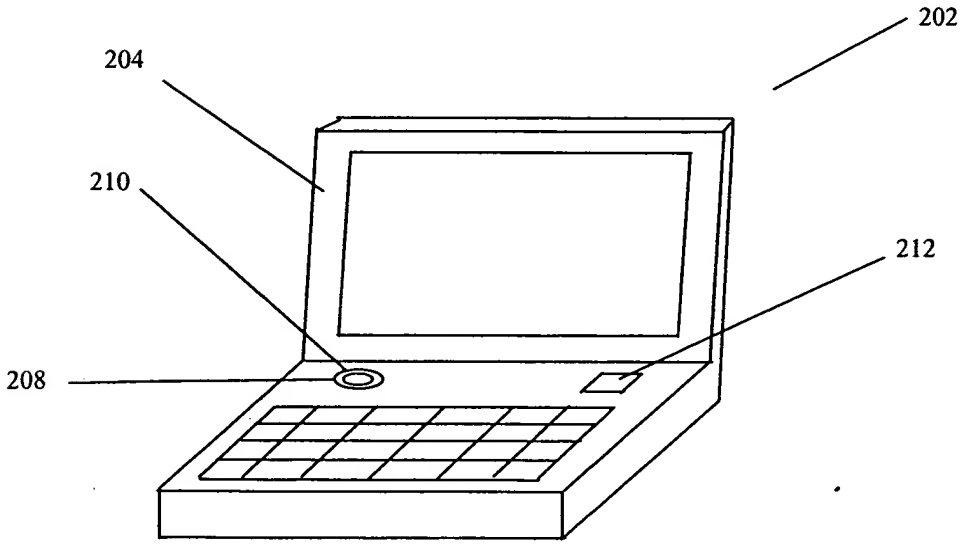

Figure 2

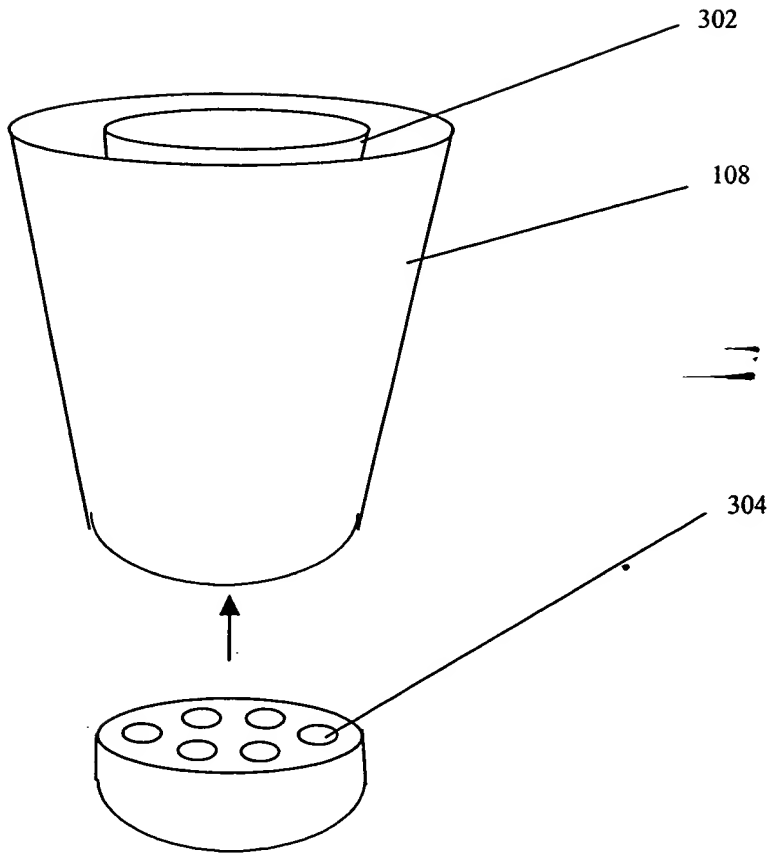

Figure 3

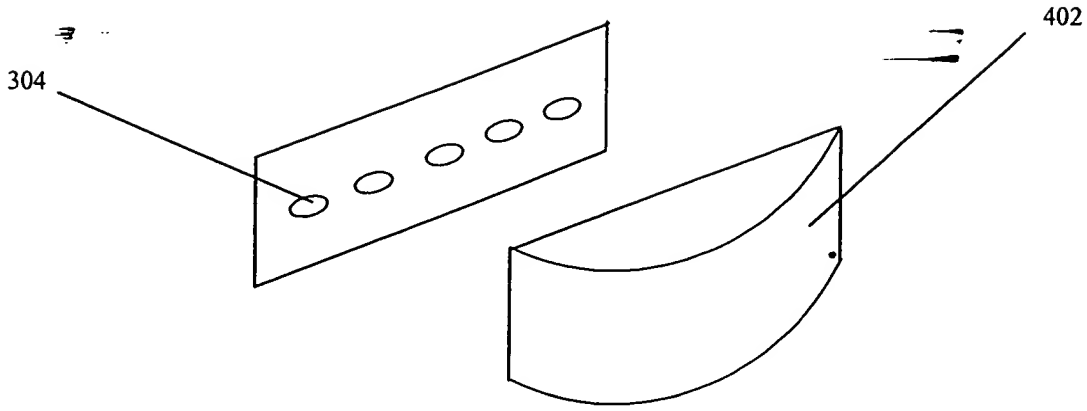

Figure 4

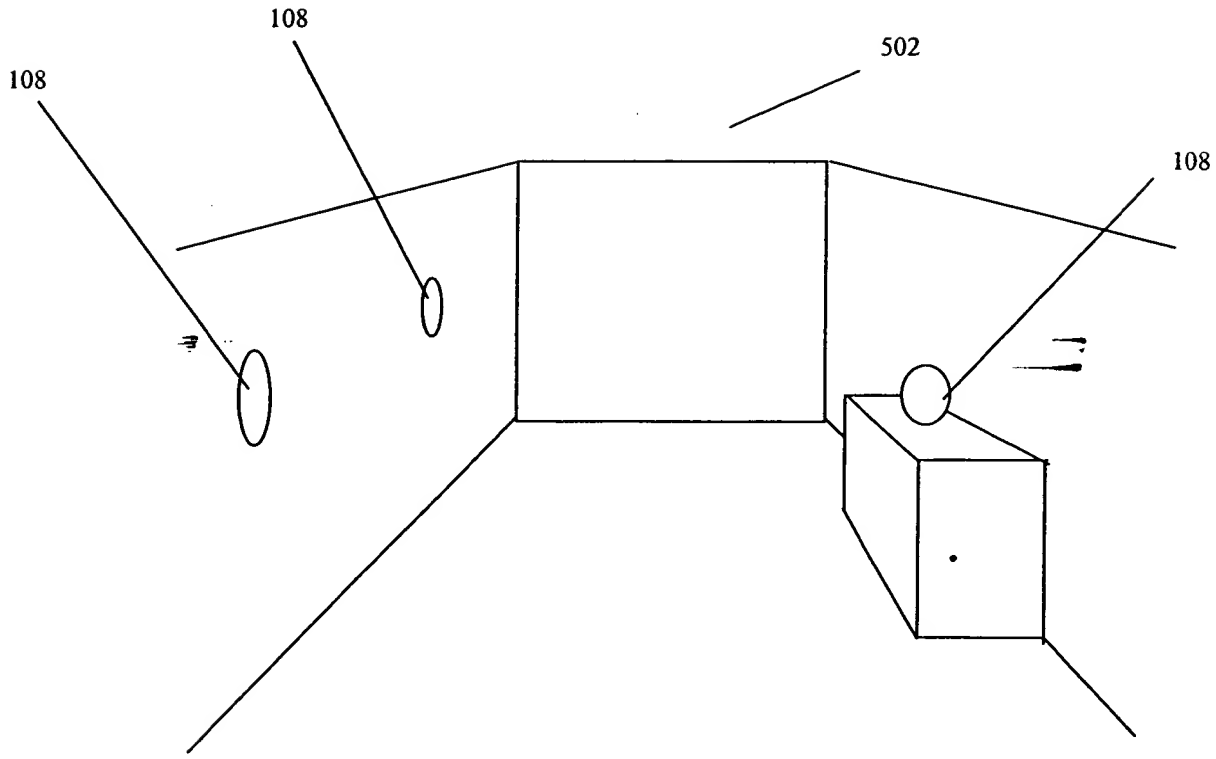

Figure 5

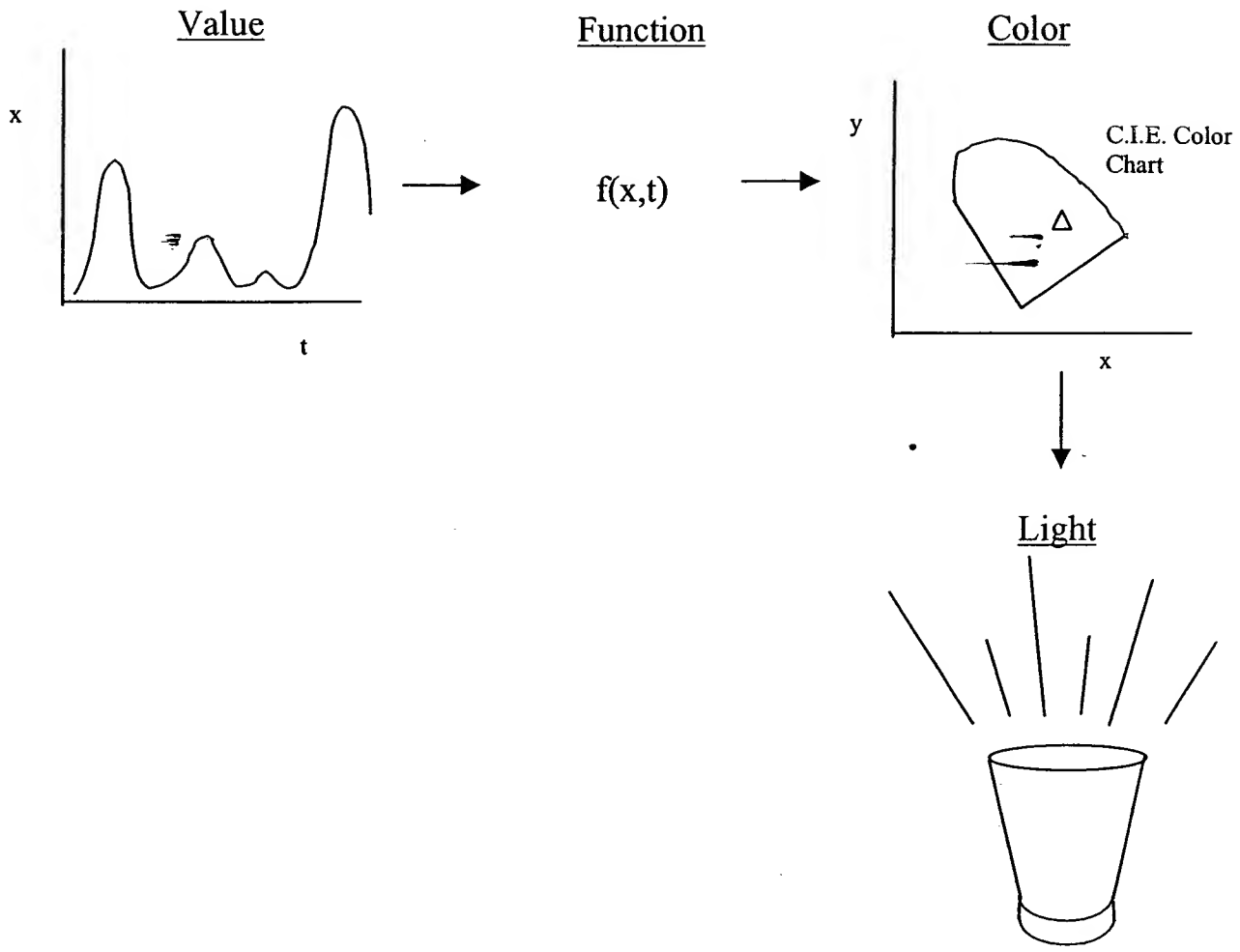

Figure 6

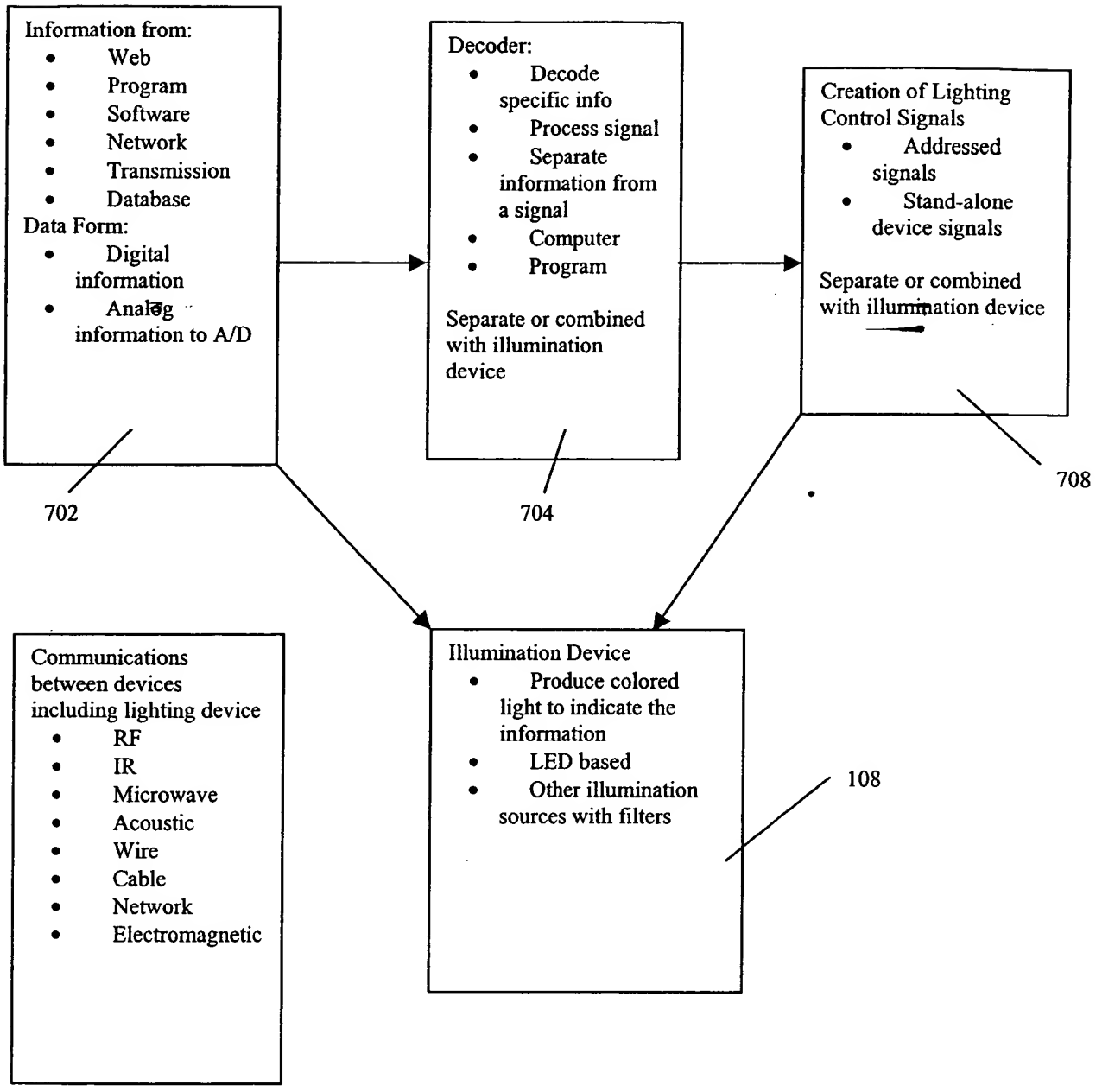
Information from:
• Web
• Program
• Software
• Network
• Transmission
• Database
Data Form:
• Digital information
• Analog information to A/D
702
Decoder:
• Decode specific info
• Process signal
• Separate information from a signal
• Computer
• Program
Separate or combined with illumination device
704
Creation of Lighting Control Signals
• Addressed signals
• Stand-alone device signals
Separate or combined with illumination device
708
Communications between devices including lighting device
• RF
• IR
• Microwave
• Acoustic
• Wire
• Cable
• Network
• Electromagnetic
Illumination Device
• Produce colored light to indicate the information
• LED based
• Other illumination sources with filters
108

Figure 7

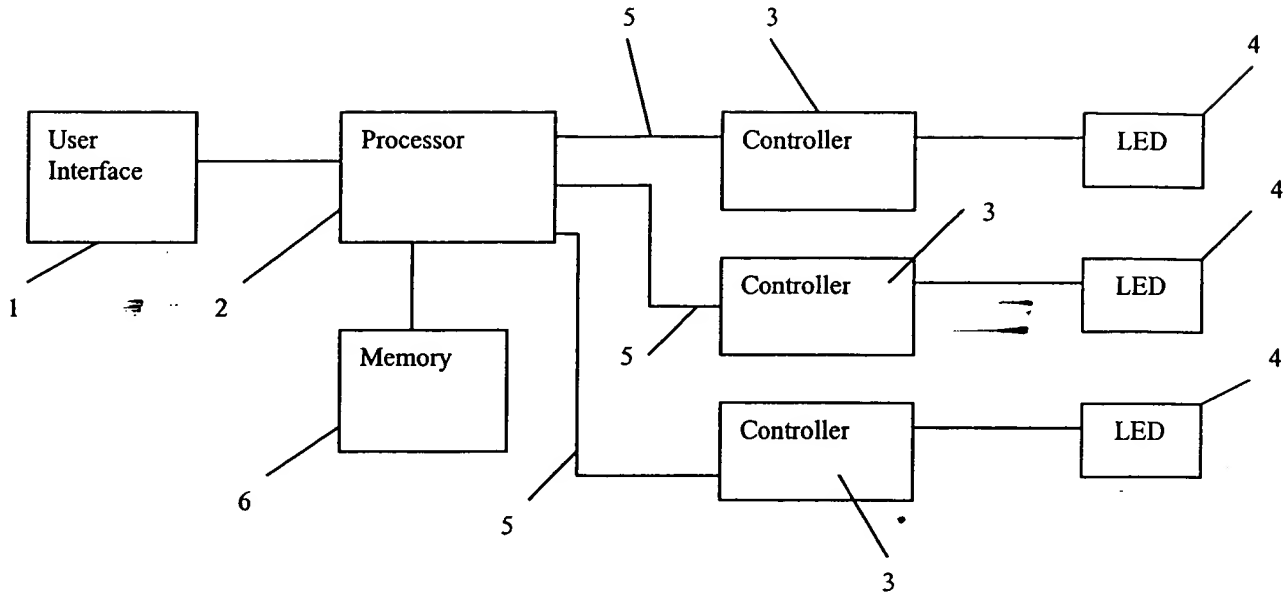
User Interface
Processor
Controller
LED
Controller
LED
Controller
LED
Memory
1
2
3
4
5
6

Figure 8